MATH (5 QUESTIONS)

N°1

Let the sequence be defined by

$$u_n = \frac{2n^2 + 3}{n^2 - n}.$$

What is the limit of the sequence (u_n) as $n \to +\infty$?

A. 2

B. 1

C. $+\infty$

D. The sequence has no limit

N°2

Compute the integral:

$$I = \int xe^x \, dx.$$

A. $I = e^x + C$

B. $I = xe^x + C$

C. $I = (x - 1)e^x + C$

D. $I = (x + 1)e^x + C$

N°3

Consider the differential equation

$$y' = 2y.$$

What is the general solution?

A. $y(x) = 2e^x$

B. $y(x) = Ce^{2x}$, with $C \in \mathbb{R}$

C. $y(x) = Ce^x$, with $C \in \mathbb{R}$

D. $y(x) = 2x + C$, with $C \in \mathbb{R}$

N°4

Let the matrix be

$$A = \begin{pmatrix} 1 & 0 & 2 \\ -1 & 3 & 1 \\ 2 & 1 & 0 \end{pmatrix}.$$

What is the value of $\det(A)$?

A. -15

B. 15

C. -9

D. 9

N°5

Consider the expression:

$$E = \frac{1 - \cos(2x)}{\sin(2x)}.$$

What is the simplified form of E (for x such that the expression is defined)?

A. $\tan(x)$

B. $\cot(x)$

C. $\tan\left(\frac{x}{2}\right)$

D. $\frac{1}{\tan(x)}$